

What is claimed is:

1. A method for aligning a semiconductor wafer and a mask, comprising the steps of:

5 providing a semiconductor wafer having an alignment mark formed thereon;

providing a mask having a pattern formed thereon;

illuminating the mask so as to create a bright spot thereon by a $0-\pi$ phase conflict; and

10 aligning the alignment mark with the bright spot, so as to align the semiconductor wafer with the mask.

2. The method according to claim 1, further comprising the step of creating the alignment mark on the semiconductor wafer in a form of a frame.

3. The method according to claim 2, wherein said creating step comprises the step of creating the frame to minimize an impact of film stack variations.

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4. The method according to claim 1, further comprising the step of creating the alignment mark on the semiconductor wafer in a form of a box structure.

5. The method according to claim 4, wherein said creating step comprises the step of creating the box structure to minimize an impact of film stack variations.

5 6. A method for aligning a semiconductor wafer and a mask, comprising the steps of:

providing a semiconductor wafer having a film stack from which light is reflected and an alignment mark formed on the semiconductor wafer;

10 providing a mask having a pattern formed thereon;

illuminating the mask so as to create a bright spot thereon by a $0\text{-}\pi$ phase conflict during an illumination, the bright spot being independent of variations of the film stack; and

15 aligning the alignment mark with respect to the bright spot, so as to align the semiconductor wafer with the mask independent of the variations of the film stack.

7. The method according to claim 6, further
20 comprising the step of creating the alignment mark on the semiconductor wafer in a form of a frame.

8. The method according to claim 7, wherein said creating step comprises the step of creating the frame to minimize an impact of film stack variations.

5 9. The method according to claim 6, further comprising the step of creating in the alignment mark on the semiconductor wafer in a form of a box structure.

10 10. The method according to claim 7, wherein said creating step comprises the step of creating the box structure to overcome an impact of film stack variations.

11. A system for aligning a semiconductor wafer and a mask, comprising:

15 an illumination tool for irradiating the mask so as to create a bright spot thereon by a $0-\pi$ phase conflict during an illumination;

a detection tool for detecting the bright spot and the alignment mark; and

20 alignment means for aligning the alignment mark with the bright spot so as to align the semiconductor wafer with the mask.

12. The system according to claim 11, wherein the alignment mark on the semiconductor wafer is in a form of a frame.

5 13. The system according to claim 12, wherein the frame is created to minimize an impact of film stack variations.

10 14. The system according to claim 11, wherein the alignment mark on the semiconductor wafer is in a form of a box structure.

15 15. The system according to claim 14, wherein the box structure is created to minimize an impact of film stack variations.

16. The system according to claim 11, wherein the illumination tool generates the alignment mark in a form of a frame.

20 17. The system according to claim 16, wherein the illumination tool generates the frame to minimize an impact of film stack variations.

18. The system according to claim 11, wherein the illumination tool generates the alignment mark in a form of a box structure.

5 19. The system according to claim 18, wherein the illumination tool generates the box structure to minimize an impact of film stack variations.